

WHAT IS CLAIMED IS:

1. A solid-state imaging device, comprising:
a plurality of pixel cells that are laid out in matrix form on a
5 semiconductor substrate; and
a driving unit that is provided to drive the plurality of pixel cells,
wherein each of the plurality of pixel cells includes:
a photodiode that converts incident light into a signal charge and
stores the signal charge;
10 at least one MOS transistor that is provided to read out the signal
charge stored in the photodiode; and
an element isolating portion that is formed so that the photodiode
and each of the at least one MOS transistor are isolated from each other, the
element isolating portion being formed of a STI (Shallow Trench Isolation)
15 that is a grooved portion of the semiconductor substrate, and
in the semiconductor substrate, a STI leakage stopper in which an
impurity of a conductive type opposite to a conductive type of source/drain
regions in the at least one MOS transistor is introduced is formed to enclose
side walls and a bottom face of the element isolating portion forming the
20 grooved portion.
2. The solid-state imaging device according to claim 1,
wherein the element isolating portion is formed so as to isolate the
photodiode from another photodiode contained in a pixel cell adjacent to one
25 of the plurality of pixel cells containing the photodiode.
3. The solid-state imaging device according to claim 1,
wherein the at least one MOS transistor is a plurality of MOS
transistors, and
30 the element isolating portion is formed so that one of the plurality
of MOS transistors is isolated from another one of the plurality of MOS
transistors.
4. The solid-state imaging device according to claim 1,
35 wherein the STI leakage stopper has a thickness of not less than
0.01 μm .

5. The solid-state imaging device according to claim 1,
wherein the STI leakage stopper has a thickness of not less than
0.02 μm .

5 6. The solid-state imaging device according to claim 1,
wherein the driving unit includes:
a vertical driving circuit that drives the plurality of pixel cells along
a row direction; and
a horizontal driving circuit that drives the plurality of pixel cells
10 along a column direction.

7. The solid-state imaging device according to claim 1,
wherein the photodiode is an embedded photodiode in which a p+
layer, an n layer and a p layer are formed in this order starting from a
15 surface side of the semiconductor substrate, and
the STI leakage stopper is formed so as to be linked to the p+ layer
of the photodiode.

8. The solid-state imaging device according to claim 1,
20 wherein a MOS transistor constituting the driving unit is an NMOS
transistor.

9. The solid-state imaging device according to claim 8,
wherein the NMOS transistor constituting the driving unit forms
25 an NMOS dynamic logic circuit.

10. The solid-state imaging device according to claim 1,
wherein a design rule for microfabrication of not more than 0.25 μm
is used for microfabrication of the plurality of pixel cells.

30 11. The solid-state imaging device according to claim 1,
wherein the STI leakage stopper has a thickness that is larger at
the bottom face of the element isolating portion than at the side walls of the
element isolating portion.

35 12. The solid-state imaging device according to claim 1,
wherein the impurity introduced in the STI leakage stopper has a

peak concentration of not less than $1 \times E^{17} \text{ cm}^{-3}$.

13. The solid-state imaging device according to claim 1,
wherein the impurity introduced in the STI leakage stopper has a
5 peak concentration of not less than $5 \times E^{18} \text{ cm}^{-3}$.

14. A method of manufacturing a solid-state imaging device, the device
being a solid-state imaging device as claimed in claim 1, comprising the
steps of:

10 forming a groove by grooving the semiconductor substrate so that
the photodiode and each of the at least one MOS transistor are isolated from
each other;

implanting ions into the groove so that the STI leakage stopper is
formed to enclose side walls and a bottom face of the groove;

15 forming the element isolating portion formed of the STI (Shallow
Trench Isolation) in the groove;

forming the photodiode on the semiconductor substrate after the
step of forming the element isolating portion; and

20 forming the at least one MOS transistor on the semiconductor
substrate such that each of the at least one MOS transistor is isolated from
the photodiode by the element isolating portion.